

(12) **United States Patent**
Rozek et al.

(10) **Patent No.:** **US 9,211,042 B2**
(45) **Date of Patent:** **Dec. 15, 2015**

(54) **PINCH ROLLER ASSEMBLY FOR A DISPENSER**

254/564.5, 565

See application file for complete search history.

(75) Inventors: **Roy J. Rozek**, Neenah, WI (US); **Abby C. Case**, Green Bay, WI (US)

(56) **References Cited**

U.S. PATENT DOCUMENTS

(73) Assignee: **Georgia-Pacific Consumer Products LP**, Atlanta, GA (US)

3,223,350	A *	12/1965	Bock et al.	242/564.4
4,738,176	A *	4/1988	Cassia	83/208
5,452,832	A *	9/1995	Niada	225/11
6,079,305	A *	6/2000	Bloch et al.	83/335
6,314,850	B1 *	11/2001	Morand	83/327
6,363,824	B1 *	4/2002	Granger	83/334
6,378,725	B1 *	4/2002	Granger	221/30
6,684,751	B2 *	2/2004	Kapiloff et al.	83/649
6,820,785	B2 *	11/2004	Kapiloff	225/14
6,903,654	B2 *	6/2005	Hansen et al.	340/562
7,222,816	B2 *	5/2007	Clark	242/566

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 74 days.

(21) Appl. No.: **13/430,434**

(22) Filed: **Mar. 26, 2012**

(Continued)

(65) **Prior Publication Data**

US 2012/0241548 A1 Sep. 27, 2012

FOREIGN PATENT DOCUMENTS

WO	2010/046662	A1	4/2010
WO	2010/129742	A2	11/2010

Related U.S. Application Data

OTHER PUBLICATIONS

(60) Provisional application No. 61/467,247, filed on Mar. 24, 2011.

International Search Report and the Written Opinion of the International Searching Authority for PCT/US2012/030607 mailed Oct. 29, 2012.

(51) **Int. Cl.**

B65H 49/00	(2006.01)
B65H 16/00	(2006.01)
A47K 10/34	(2006.01)
A47K 10/36	(2006.01)
B65H 27/00	(2006.01)

(Continued)

(52) **U.S. Cl.**

CPC **A47K 10/34** (2013.01); **A47K 10/36** (2013.01); **B65H 16/005** (2013.01); **B65H 27/00** (2013.01); **B65H 2404/13161** (2013.01); **B65H 2404/14** (2013.01); **B65H 2601/273** (2013.01)

Primary Examiner — Emmanuel M Marcelo

Assistant Examiner — Michael Gallion

(74) *Attorney, Agent, or Firm* — Sutherland Asbill & Brennan LLP

(58) **Field of Classification Search**

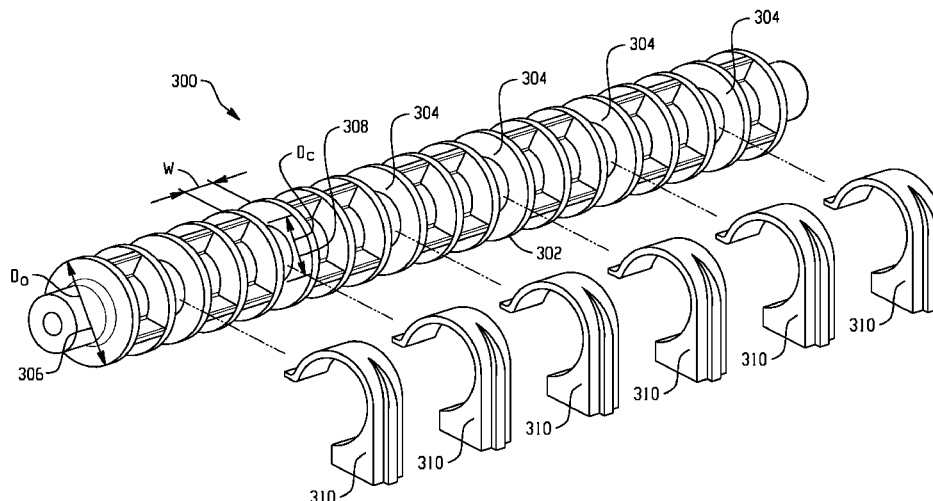
CPC **A47K 10/36**; **A47K 10/34**; **B41J 15/042**; **B65H 6/10**
USPC 254/564, 564.1, 564.2, 564.3, 564.4,

(57)

ABSTRACT

A pinch roller assembly for a sheet product dispenser includes a roller body and a plurality of clips. The roller body includes a plurality of grooves. The roller body is rotatably associated with the plurality of clips, each clip being disposed in one of the plurality of grooves.

20 Claims, 5 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

7,237,744 B2 * 7/2007 Morris et al. 242/560.1
 7,878,445 B2 * 2/2011 Granger et al. 242/564.1
 8,376,260 B2 * 2/2013 Granger 242/566
 8,899,508 B2 * 12/2014 Hjort et al. 242/564.4
 2006/0138274 A1 * 6/2006 Goeking et al. 242/564.4
 2007/0079684 A1 * 4/2007 Friesen et al. 83/649

2007/0176041 A1 * 8/2007 Friesen et al. 242/563
 2009/0140001 A1 * 6/2009 Lewis et al. 221/13
 2010/0012674 A1 * 1/2010 Brownlee 221/1

OTHER PUBLICATIONS

PCT International Preliminary Report on Patentability for International Application No. PCT/US2012/030607 issued Sep. 24, 2013.

* cited by examiner

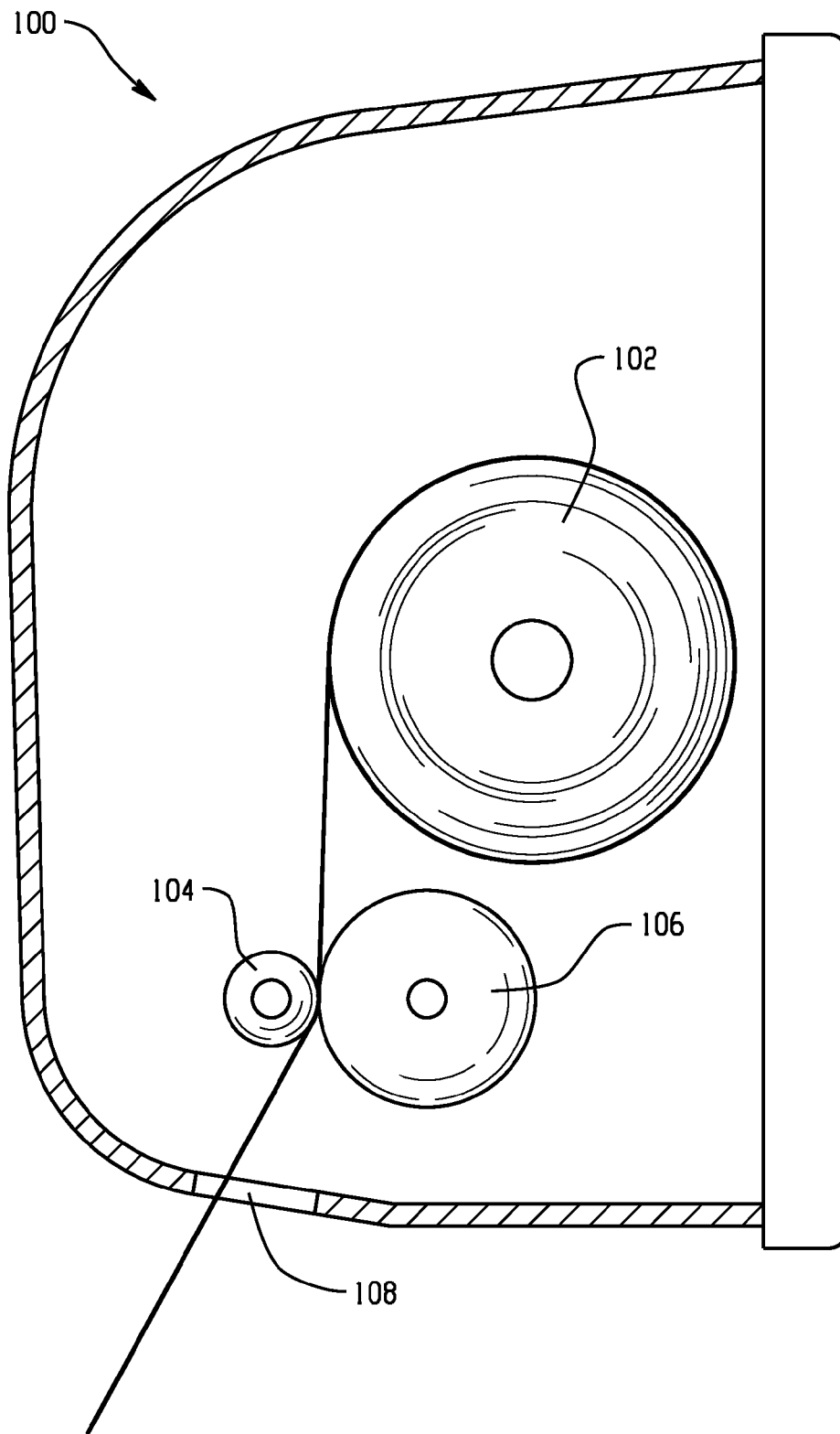
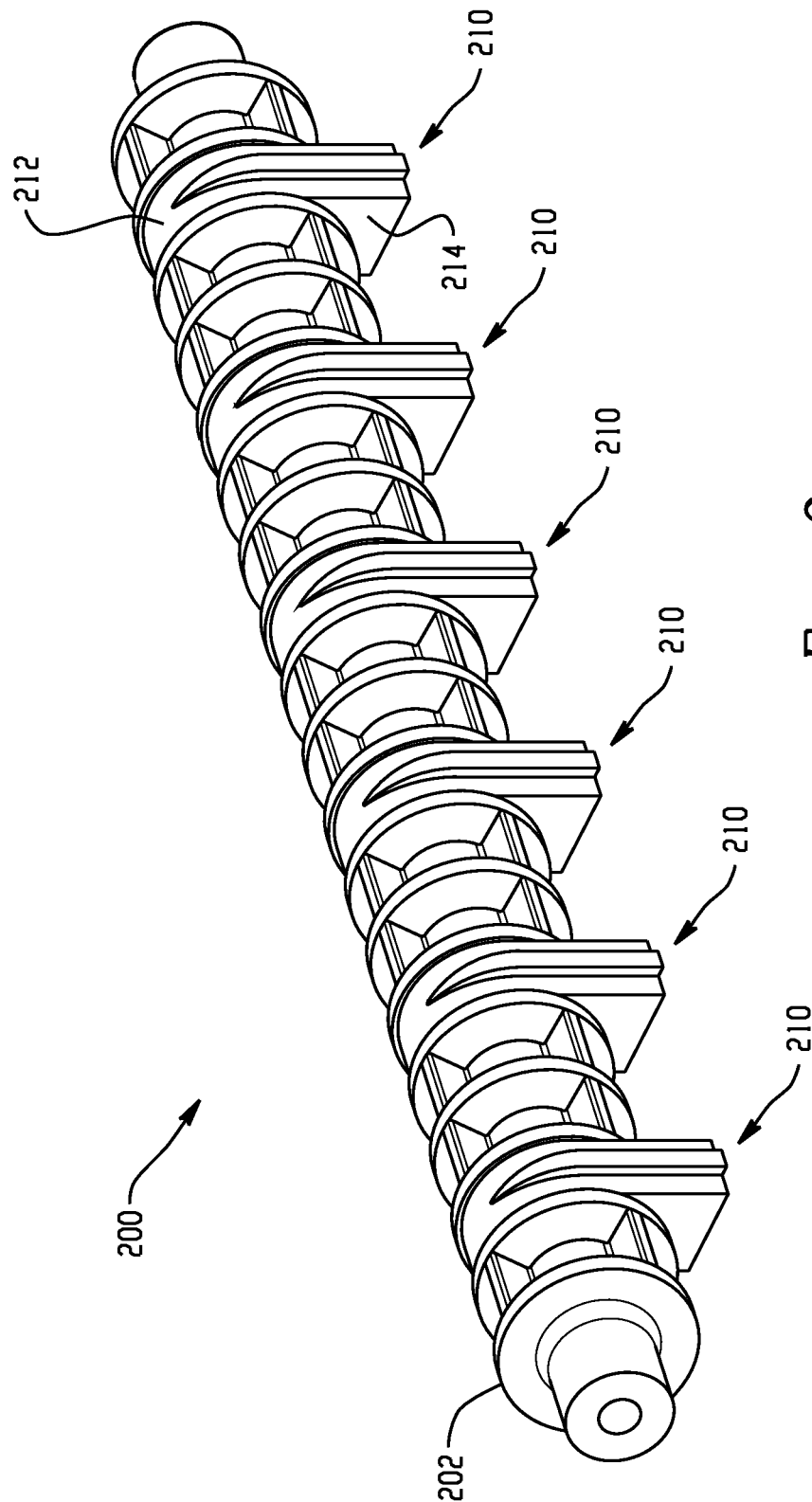


Fig. 1



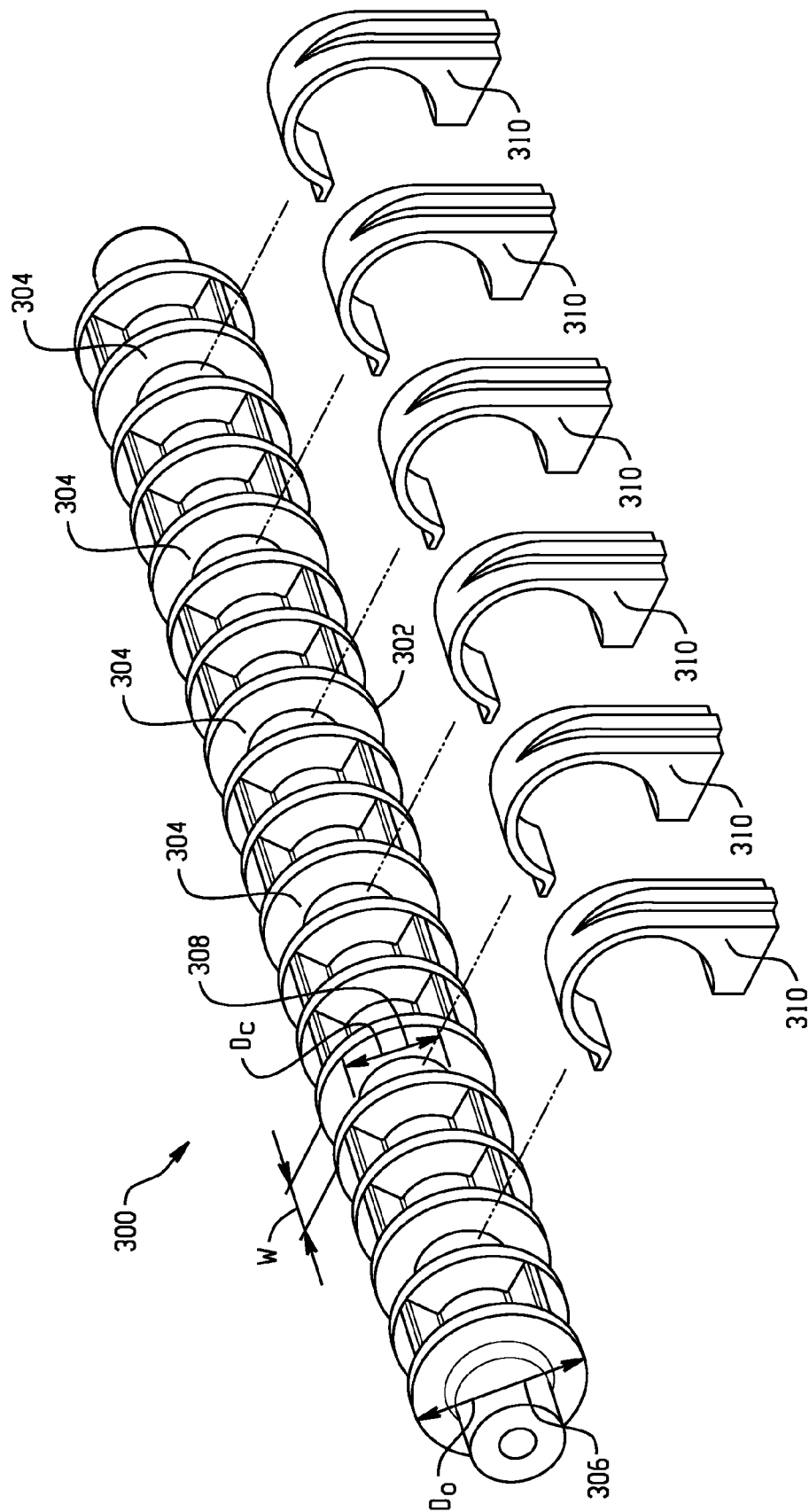
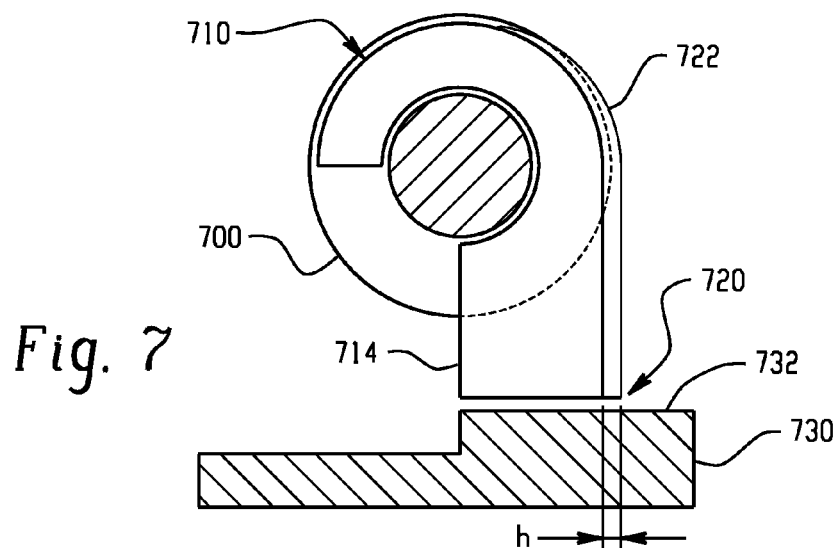
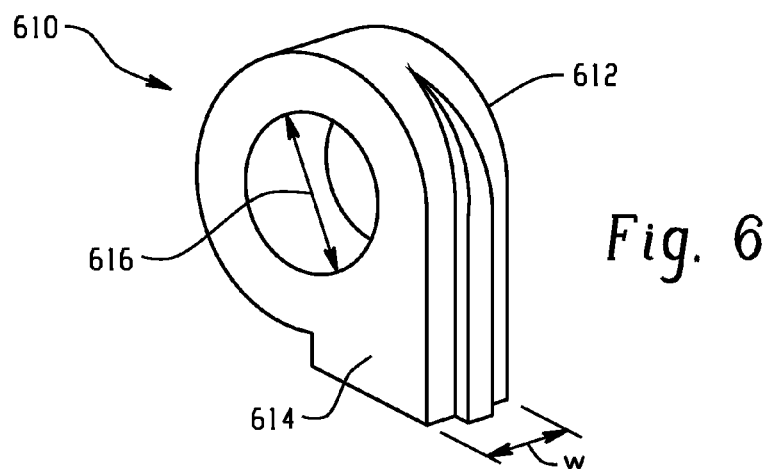
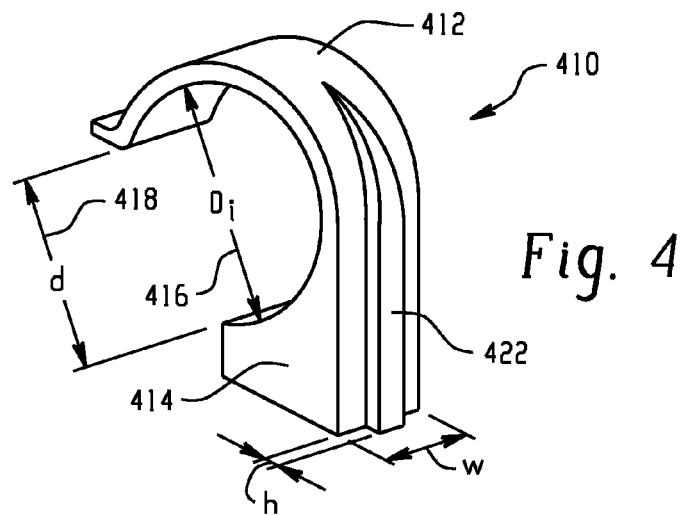


Fig. 3



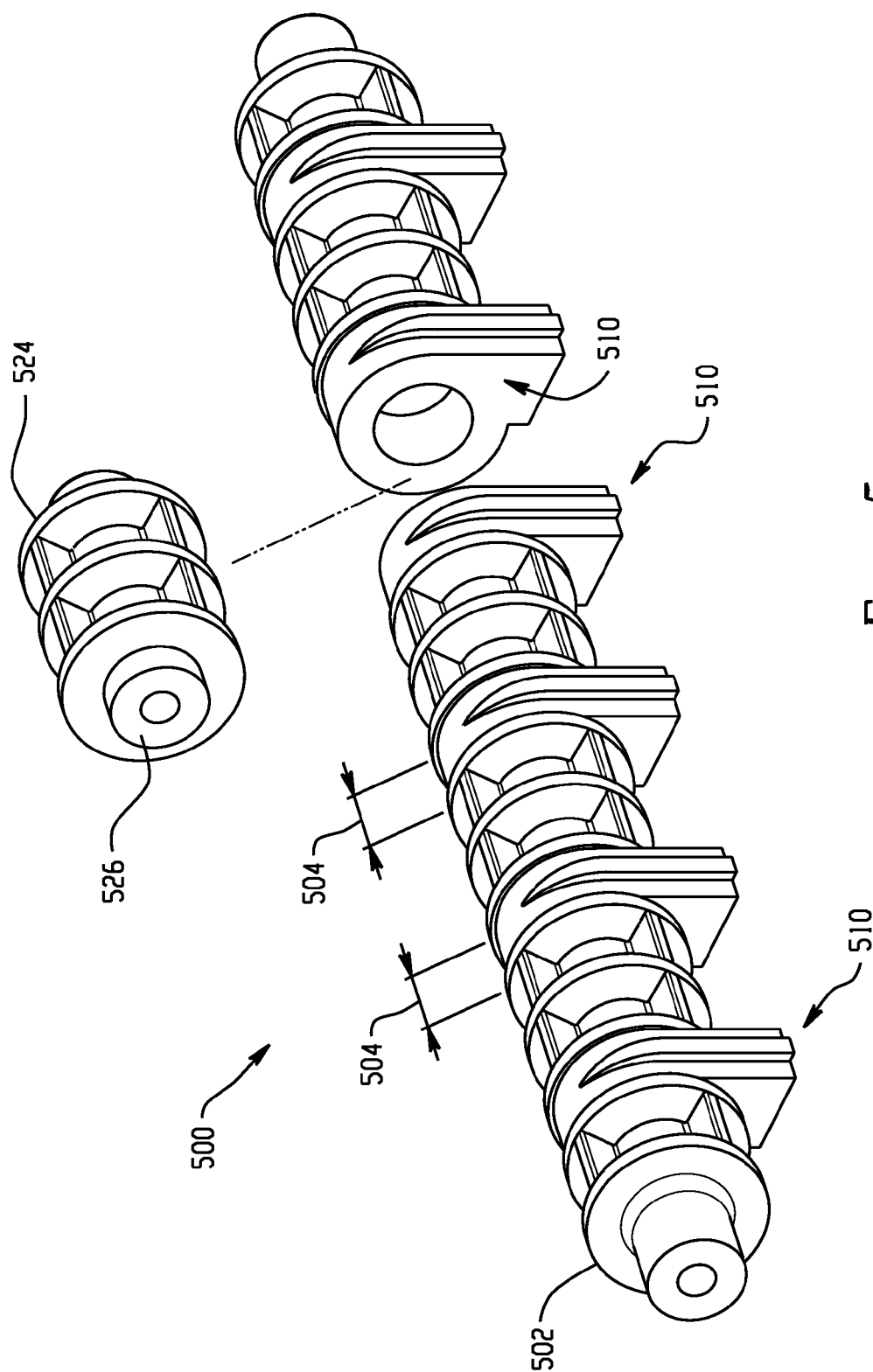


Fig. 5

1

PINCH ROLLER ASSEMBLY FOR A DISPENSER

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to U.S. Provisional Patent Application No. 61/467,247, filed Mar. 24, 2011, which is incorporated by reference in its entirety.

BACKGROUND

The present disclosure relates generally to the field of dispensing apparatuses, and more particularly to a pinch roller for a dispensing apparatus for sheet products.

Dispensers for sheet products are known in the art and are available with a wide variety of designs. Typically, dispensers have a drive roller, a pinch roller, and a roll of sheet product. The drive roller and pinch roller together form a nip through which the sheet product passes during dispensing.

One problem with this configuration results when water is present in the dispenser, such as when water is splashed into the dispenser through the dispensing chute. Any combination of the sheet product, the drive roller, and the pinch roller may become wet. In such a case, the sheet product may adhere to the pinch roller or become wrapped around the pinch roller, impeding the dispenser from dispensing properly. A need exists for a dispenser, and more particularly a pinch roller for a dispenser, that addresses this deficiency.

BRIEF DESCRIPTION OF THE INVENTION

A pinch roller assembly for a sheet product dispenser includes a roller body and a plurality of clips. The roller body includes a plurality of grooves. The roller body is rotatably associated with the plurality of clips, each clip being disposed in one of the plurality of grooves.

A dispenser for dispensing sheet product includes a housing, a drive roller, and a pinch roller assembly. Together the drive roller and the pinch roller assembly define a nip configured to receive the sheet product. The pinch roller assembly includes a roller body and a plurality of clips. The roller body has a plurality of grooves. The roller body is rotatably associated with the plurality of clips, each clip being disposed in one of the plurality of grooves.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of an embodiment of a dispenser that can be used with an embodiment of a pinch roller assembly as described herein.

FIG. 2 is a perspective view of an embodiment of a pinch roller assembly that is configured to reduce adherence of a sheet product to one or more dispensing rollers of a dispenser.

FIG. 3 is an exploded perspective view of a pinch roller assembly that is configured to reduce adherence of a sheet product to one or more dispensing rollers of a dispenser.

FIG. 4 is a perspective view of an embodiment of a clip of a pinch roller assembly.

FIG. 5 is a partially exploded perspective view of an embodiment of a pinch roller assembly.

FIG. 6 is a perspective view of another embodiment of a clip of a pinch roller assembly.

FIG. 7 is a cross sectional end view of an embodiment of a pinch roller assembly disposed in a dispenser.

DETAILED DESCRIPTION

FIG. 1 is a cross-sectional view of an embodiment of a dispenser **100** that is configured to reduce adherence of a

2

dispensed product to one or more dispensing rollers. The dispenser **100** houses sheet product **102**, which is disposed about a roll in the illustrated embodiment. So that the dispenser **100** can dispense the sheet product **102** from the roll, the dispenser **100** includes dispensing rollers positioned adjacent to a dispensing chute **108**. The dispensing rollers include a pinch roller **104** and a drive roller **106**, which together define a nip. When the drive roller **106** is rotated, the sheet product **102** is pulled from the roll through the nip and is dispensed through the dispensing chute **108**. For example, the drive roller **106** may be rotated with a motor or a user-actuated mechanism, such as a lever, a button, a wheel, or a user-initiated pulling force upon a tail end of the sheet product external to the dispenser.

In embodiments, the pinch roller **104** may be an embodiment of a pinch roller assembly described herein, which is configured to reduce adherence of the dispensed product to the dispensing rollers during dispensing. It should be noted that FIG. 1 illustrates the dispenser **100** in simplified form for the purpose of illustration, and a person of skill in the art would understand that a wide variety of other mechanical or automated dispensers may be used with the embodiments described herein to dispense rolled or folded sheet products.

FIG. 2 illustrates an embodiment of a pinch roller assembly **200** that is configured to reduce or prevent adherence of the dispensed product to the pinch roller or the drive roller during dispensing. The pinch roller assembly **200** includes a roller body **202** and a plurality of clips **210** that are disposed along the roller body **202**. The clips **210** are rotatably associated with the roller body **202** such that the roller body **202** can freely rotate while the clips **210** remain stationary. For example, the clips **210** may abut a portion of the dispenser, such that as the roller body **202** rotates, the clips **210** contact the dispenser and slip with reference to the roller body **202**, remaining stationary against the dispenser.

Each clip **210** has a hook portion **212** and a body portion **214**. The hook portion **212** mates with the roller body **202**, while the body portion **214** extends away from the roller body **202** in a radially outward direction. The hook portion **212** has a maximum outer diameter that is smaller than or approximately equal to a maximum outer diameter of the roller body **202**, so that as the roller body **202** rotates during dispensing, the hook portion **212** does not impede the roller body **202** from engaging the drive roller to urge the sheet product towards the dispensing chute. The body portion **214** extends beyond the roller body **202** and abuts a portion of the dispenser, so that the clips **210** remain stationary as the roller body **202** rotates. Because the body portion **214** extends beyond the roller body **202**, the clips **210** reduce or prevent sheet product that may have adhered to the roller body **202** from wrapping around the roller body **202** as it rotates.

The number and placement of clips **210** along the roller body **202** are selected to reduce or prevent sheet product from adhering to and wrapping about the roller body **202** during dispensing. In the illustrated embodiment, six clips **210** are disposed along the length of the roller body **202** in spaced positions. However, other numbers of clips **210** may be employed depending on the length of the roller body **200**, such as between three and eight clips. The number of clips **210** may be limited such that the clips **210** do not interfere with or inhibit the function of the pinch roller assembly **200**. For example, the combined surface area of the clips **210** may constitute approximately twenty percent or less of the surface area of the roller body **202**. Because edges of the sheet product may be prone to adhering to edges of the roller body **202**, some clips **210** may be disposed adjacent to ends of the roller

3

body **202**, such as about one-half to one inch from each end of the roller body **202**. However, other configurations are possible.

FIG. **3** is an exploded perspective view of a pinch roller assembly **300**, which includes a roller body **302** and a plurality of clips **310**. The roller body **302** has an outer surface and an inner core. The outer surface has an outer surface diameter **306** with a value D_o , and the inner core has an inner surface diameter **308** with a value D_c that is less than D_o . A plurality of grooves **304** are spaced along the length of the roller body **302**, exposing the inner core. The grooves **304** are designed to accommodate the clips **310**. Between the grooves **304**, at least a portion of the roller body **302** has the outer surface, which contacts the drive roller. For example, the outer surface of the roller body **302** may be solid or continuous between the grooves **304**, such that the roller body **302** has the outer surface diameter **306** along its entire length except at the grooves **304** where the inner core is exposed. Alternatively, the roller body **302** may be discontinuous between the grooves **304**, having some portions that form the outer surface for contacting the driver roller and other portions that are recessed or completely lack material to expose the inner core. For example, in the illustrated embodiment the roller body **302** has radially extending fins and adjoining ribs that form the outer surface of the roller body **302** for contacting the drive roller, but between the fins and ribs, the roller body **302** lacks material exposing the core.

The clips **310** are sized to fit within the grooves **304** such that the roller body **302** can rotate freely with reference to the clips **310**. For example, the dimensions of the clip **310** may be selected to allow the clips **310** to slip with reference to the roller body **302** as it rotates, without the clips **310** disengaging or separating from the roller body **302**. In embodiments, the grooves **304** of the roller body **302** are designed receive the clips **310**. The grooves **304** have a width W , and the clips **310** have a width w that is less than the width W of the grooves **304**.

In embodiments, the roller body **302** may be formed with an absence of material at discrete locations along its length to form the grooves **304**, such as by molding. In other embodiments, the roller body **302** may be formed with a solid construction and a portion of the material may be removed to form the grooves **304**. In yet other embodiments, the roller body **302** may be constructed from multiple pieces that are subsequently connected, as discussed in more detail with reference to FIG. **5**.

FIG. **4** is a perspective view of an embodiment of a clip **410** of a pinch roller assembly, illustrating a hook portion **412** and a body portion **414** of the clip in greater detail. The clip **410** may be formed from a resilient material, such as a plastic, although other materials such as metal may be used. In some embodiments, the hook portion **412** and the body portion **414** may be integrally formed, such as by molding, so that the clip defines a unitary or continuous piece, although the clip also may be formed upon joining two or more pieces that were formed separately.

The clip **410** has a width with a value of w , and in embodiments, the width w is sized to permit the hook portion **412** to loosely fit within the grooves on the roller body. The hook portion **412** has an inner diameter **416** with a value of D_i and an opening **418** with a value of d , and in embodiments, the opening **418** is suitably sized so as to allow the hook portion **412** to snap over the inner core of the roller body in a snap-fit manner, and the inner diameter **416** is sized so as to loosely fit over the inner core of the roller body. As used herein, the term "loosely fit" means a fit that allows unrestrained rotational movement between the roller body and the clip **410** without

4

excessive lateral movement of the clip **410** within the groove that would be contrary to the purpose described and disclosed herein.

In embodiments, the clip **410** has a rib **422** that extends outwardly from the body portion **414**. Along an upper region of the hook portion **412**, the rib **422** extends out from the clip **410** no farther than the outer diameter of the roller body. The rib **422** progressively increases in extension from the clip **410** around the perimeter of the hook portion **412**, and toward the body portion **414** the rib **422** extends beyond the outer diameter of the roller body by a distance h .

In embodiments, the roller body outer surface has a diameter D_o in the range of about 0.7 to 0.8 inches, the roller body inner core has a diameter D_c in the range of about 0.4 to about 0.6 inches, and the clip hook portion has an inner diameter D_i that sized based on the diameter D_c of the roller body inner core so that the parts of the assembly loosely fit together taking tolerances into consideration. For example, in embodiments in which the roller body inner core has a diameter D_c of about 0.50 inches, the clip hook portion has an inner diameter D_i that may be in the range of about 0.51 to 0.53 inches. In addition, the dimension d of the opening into the clip hook portion is suitably sized based on the diameter D_c of the roller body inner core so as to allow the hook portion **402** to snap over the roller body inner core. For example, in embodiments in which the diameter D_c of the inner core is 0.50 inches, the dimension d of the opening into the clip may be between about 0.35 to 0.37 inches.

In embodiments, the width W of the groove on the roller body has a value ranging from about 0.3 to 0.4 inches, and the width w of the clip is sized based on the width W of the groove so that the clip fits within the groove. For example, in embodiments in which the groove has a width W of about 0.36 inches, the clip may have a width w in the range of about 0.30 to about 0.35 inches. In one particular embodiment, D_o is about 0.740 inches, D_c is about 0.500 inches, D_i is about 0.524 inches, d is about 0.364 inches, W is about 0.360 inches, and w is about 0.310 inches. However, other dimensions are within the scope of the present disclosure.

FIG. **5** is a partially exploded perspective view of another embodiment of a pinch roller assembly **500**. As illustrated, a roller body **502** of the pinch roller assembly **500** may include a number of pieces **524**. In embodiments, the pieces **524** may have tabs **526** that extend from ends of the pieces within grooves **504**, and the clips **510** may be placed on the tabs **526** prior to assembling the roller pieces **524** to form the roller body **502**. In such embodiments of a pinch roller assembly **500**, the clips **510** may completely encircle the roller body **502** instead of snap-fitting about the roller body **502**. In addition, a pinch roller assembly **500** that is constructed of a series of pieces may have a variable length, such that the length of the pinch roller **500** can be altered by adding or removing pieces **524** and clips **500** from the pinch roller assembly **500**.

FIG. **6** illustrates an embodiment of a clip **610** that can be used with the pinch roller assembly **500** of FIG. **5**. The clip **610** has a roller-encircling portion **612** and a body portion **614**. In embodiments, the roller-encircling portion **612** and the body portion **614** are integrally formed, such as by molding plastic, although other manufacturing methods and materials can be used. In embodiments, the body portion **612** has a width w and the roller-encircling portion has an inner diameter **616**. The inner diameter **616** is suitably sized so as to loosely fit over the core diameter of the roller body, such as along the tab of a piece of the roller body. The width w is sized to permit the clip **610** to loosely fit within the grooves on the roller body.

5

FIG. 7 is a cross-sectional end view of a pinch roller assembly in accordance with the present disclosure. As illustrated, the pinch roller assembly is mounted in a dispenser, which includes a chassis 730 having a surface 732. The pinch roller assembly 700 is mounted such that a bottom end 720 of the body portion 714 of the clip 710 is positioned adjacent to the surface 732 of the chassis 730. When the roller body 700 of the assembly rotates during a dispensing action, the bottom end 720 of the clip 710 contacts the surface 732, which prevents the clip 710 from rotating with the roller body 700. In other words, the roller body 700 is able to rotate freely during dispensing while the clip 710 remains approximately stationary. In embodiments, the bottom end 720 of the clip 710 may be positioned relative to the surface 732 such that the clip 710 may have some rotational freedom of movement, such as approximately ten degrees.

As described above, the rib 722 extends outward from the clip 710, such as by the distance h along the bottom end 720 of the clip 710. If sheet product becomes wet and adheres to the roller body 700 during dispensing, the ramp-shaped rib 722, which is stationary relative to the rotating roller body 700 during a dispensing action, separates the wet sheet product from the roller body 700 thereby preventing the sheet product from wrapping around the roller body 700 and jamming in the dispenser.

In embodiments, the pinch roller assembly is suitable for use with existing dispensers having a variety of configurations. For example, the roller body 700 may have a length and an outer diameter that is substantially the same as the pinch roller of the existing dispenser, and the clips 710 may be designed to engage the chassis 730 of the existing dispenser. Accordingly, the pinch roller of an existing dispenser can be replaced with the pinch roller assembly having the roller body 700 and clips 710, to reduce the propensity of wet sheet product to adhere to the roller body as it rotates.

In embodiments, the dispenser may be a water resistant style of dispenser that is designed for use in environments in which the dispenser is exposed to water. For example, many industrial environments require periodic and thorough cleaning that can include the use of a hose to wash down the entire environment, including the walls to which a sheet product dispenser may be attached. Accordingly, water resistant dispenser designs include various elements that are used to prevent the sheet product from becoming wet. Such elements include, but are not limited to, a closeable dispensing hatch and one or more rubber gaskets to ensure water stays out of the dispenser during a wash down. While currently available water resistant dispensers include elements to prevent the sheet product from becoming wet during a wash down, the sheet product of the dispensers may still become wet during normal use, i.e., when the dispensing hatch is open. Accordingly, to overcome the problem of wet sheet product adhering to the pinch roller, a pinch roller with clips, as described in detail above, can be used with currently available water resistant dispensers.

While the invention has been described with reference to exemplary embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiment disclosed as the best or only mode contemplated for carrying out this invention, but that the invention will include all embodiments falling within the scope of the appended claims.

6

Also, in the drawings and the description, there have been disclosed exemplary embodiments of the invention and, although specific terms may have been employed, they are unless otherwise stated used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention therefore not being so limited. Moreover, the use of the terms first, second, etc. do not denote any order or importance, but rather the terms first, second, etc. are used to distinguish one element from another. Furthermore, the use of the terms a, an, etc. do not denote a limitation of quantity, but rather denote the presence of at least one of the referenced item.

What is claimed is:

1. A pinch roller assembly for a sheet product dispenser, comprising:
 - a pinch roller body having a plurality of grooves; and
 - a plurality of clips rotatably coupled to and supported by the pinch roller body, each one of the plurality of clips being disposed in one of the plurality of grooves;
 wherein each one of the plurality of clips is configured to remain approximately rotatably stationary with respect to the pinch roller body, when the pinch roller body rotates,
 wherein each one of plurality of clips is snap-fit to the pinch roller body or completely encircles the pinch roller body.
2. The pinch roller assembly of claim 1, wherein each one of the plurality of clips is removably associated with the pinch roller body.
3. The pinch roller assembly of claim 1, wherein each one of the plurality of clips comprises a hook portion snap-fit or encircling one of the plurality of grooves of the pinch roller body.
4. The pinch roller assembly of claim 1, wherein each of the plurality of clips further comprises a ramp-shaped rib extending along at least a body portion of the clip, the body portion of the clip extending radially outward from the pinch roller body.
5. The pinch roller assembly of claim 1, wherein one of the plurality of clips is positioned within one inch from an end of the pinch roller body.
6. The pinch roller assembly of claim 1, wherein the plurality of clips cover less than twenty percent of a surface area of the pinch roller body.
7. A dispenser for a sheet product, comprising:
 - a drive roller configured to rotate and thereby dispense the sheet product;
 - a motor or a user-actuated mechanism configured to rotate the drive roller;
 - a pinch roller assembly defining, with the drive roller, a nip for receiving the sheet product, the pinch roller assembly comprising:
 - a pinch roller body having a plurality of grooves; and
 - a plurality of clips rotatably coupled to and supported by the pinch roller body, each one of the plurality of clips being disposed in one of the plurality of grooves,
 wherein each one of the plurality of clips remains approximately rotatably stationary with respect to the pinch roller body, as the pinch roller body rotates,
 wherein each one of plurality of clips comprises a body portion extending outward from the pinch roller body to guide the sheet product away from the pinch roller body.
8. The dispenser of claim 7, wherein each one of the plurality of clips is removably associated with the pinch roller body.
9. The dispenser of claim 7, wherein one of the plurality of clips is positioned within one inch of an end of the pinch roller body.

7

10. The dispenser of claim 7, wherein the plurality of clips cover less than twenty percent of a surface area of the pinch roller body.

11. The pinch roller assembly of claim 1, wherein the plurality of grooves are spaced along the pinch roller body and each groove exposes an inner core of the pinch roller body.

12. The pinch roller assembly of claim 11, wherein the pinch roller body further comprises an outer surface configured to contact the drive roller.

13. The dispenser of claim 7, wherein each one of the plurality of clips comprises a hook portion mated about one of the plurality of grooves of the pinch roller body.

14. The dispenser of claim 7, wherein each one of the plurality of clips further comprises a ramp-shaped rib extending along at least the body portion of the clip, the body portion of the clip extending radially outward from the pinch roller body.

15. The dispenser of claim 7, wherein bottom ends of the body portions of the clips are configured to engage a chassis of a housing of the dispenser.

16. The dispenser of claim 7, wherein bottom ends of the body portions of the clips are configured to abut a portion of the sheet product dispenser such that each one of the plurality of clips remains stationary as the pinch roller body rotates.

17. The dispenser of claim 7, wherein the user actuated mechanism is selected from the group consisting of a lever, a button, and a wheel.

8

18. A dispenser for a sheet product, comprising:

a drive roller configured to rotate and thereby dispense the sheet product;

a motor or a user-actuated mechanism configured to rotate the drive roller;

a pinch roller assembly defining, with the drive roller, a nip for receiving the sheet product, the pinch roller assembly comprising:

a pinch roller body having a plurality of grooves; and

a plurality of clips rotatably coupled to and supported by the pinch roller body, each one of the plurality of clips being disposed in one of the plurality of grooves,

wherein each one of the plurality of clips remains approximately rotatably stationary with respect to the pinch roller body, as the pinch roller body rotates,

wherein each one of plurality of clips is snap-fit to the pinch roller body or completely encircles the pinch roller body.

19. The dispenser of claim 18, wherein each one of the plurality of clips comprises a hook portion snap-fit or encircling one of the plurality of grooves of the pinch roller body.

20. The dispenser of claim 18, wherein each one of plurality of clips comprises a body portion extending outward from the pinch roller body to guide the sheet product away from the pinch roller body.

* * * * *